What is claimed is:

1. A method of depositing material onto a substrate having a substrate layer of material, comprising:

generating a plasma within a chamber;

sputtering metal material from a target within said chamber to deposit metal material onto said substrate layer;

etching from said substrate within said chamber a portion of said metal material sputter deposited onto said substrate;

monitoring through a folded radiation path within said chamber, radiation emitted by materials within said plasma; and

terminating said etching in response to radiation monitored through said folded radiation path.

2. The method of claim 1 wherein said etching occurs while sputtering additional metal material onto said substrate.

3. The method of claim 2 wherein said sputtering additional metal material includes sputtering metal material from an RF coil.

4. The method of claim 3 wherein said coil sputtering includes biasing said coil to attract ions to sputter said coil.

5. The method of claim 3 wherein said generating includes applying RF power to said RF coil to generate ions and said etching includes biasing said substrate to attract said generated ions to said substrate.

6. The method of claim 1 wherein said monitoring includes detecting the composition of materials etched from said substrate as a function of the wavelengths of emitted radiation monitored while etching said substrate; and wherein said terminating includes terminating said etching in response to detection of an etched material composition.

7. The method of claim 1 further comprising blocking deposition onto a window of at least some material sputtered from said target using a wall positioned between said window and target and wherein said monitoring through a folded radiation path includes reflecting radiation emitted by said plasma around said wall to said window and monitoring the wavelengths of radiation transmitted through said

window to a wavelength detector positioned outside said chamber window.

8. The method of claim 1 wherein said target sputtering includes rotating a magnetron about the back of the target, said magnetron having an area of no more than about 1/4 of the area of the target and including an inner magnetic pole of one magnetic polarity surrounded by an outer magnetic pole of an opposite magnetic polarity, a magnetic flux of said outer pole being at least 50% larger than the magnetic flux of said inner pole;

9. A method of depositing material onto a substrate having a substrate layer, comprising:

sputtering a target within a chamber to deposit target material onto said substrate within said chamber;

ionizing at least a portion of said sputtered target material to form sputtered target material ions;

biasing said substrate to attract said sputtered target material ions to deposit onto said substrate;

sputtering a coil within said chamber to deposit coil material onto said substrate;

energizing said coil to generate etchant ions in said chamber to resputter target material from said substrate;

biasing said substrate to attract said etchant ions to resputter target material from said substrate;

monitoring the wavelengths of radiation emitted by materials resputtered from said substrate while energizing said coil;

detecting the composition of materials resputtered from said substrate as a function of the wavelengths of emitted radiation monitored while resputtering said substrate; and

terminating said resputtering in response to detection of an etched material composition.

10. The method of claim 9 further comprising blocking deposition onto a window of at least some material sputtered from said target and said coil using a wall positioned between said window and said target and coil, and wherein said monitoring includes reflecting radiation emitted by said plasma through a folded radiation path around said wall to said window and monitoring the wavelengths of radiation transmitted through said window to a wavelength detector positioned outside said chamber window.

11. A method of depositing material onto a substrate having a conductor layer and an insulator overlying the conductor layer, comprising:

sputtering a target within a chamber to deposit metal target material into holes in said insulation layer overlying said conductor layer of a substrate within said chamber;

ionizing at least a portion of said sputtered target material to form sputtered target material ions;

biasing said substrate to attract said sputtered target material ions to deposit target material into said holes of said substrate;

energizing a coil within said chamber with RF energy to inductively couple RF energy into a plasma to generate etchant ions in said chamber to resputter material from said substrate;

sputtering said coil within said chamber to deposit coil material onto said substrate while generating said etchant ions;

blocking deposition onto a chamber window of at least some material sputtered from said target and said coil using a wall positioned between said window and said target and coil

biasing said substrate to attract said etchant ions to resputter target material from the bottoms of holes of said substrate;

monitoring the wavelengths of radiation emitted by materials resputtered from said substrate while sputtering said coil wherein said monitoring includes reflecting radiation emitted by said plasma through a folded radiation path around said wall to said window and monitoring the wavelengths of radiation transmitted through said window to a wavelength detector positioned outside said chamber window;

using said detector, detecting the composition of materials resputtered from said substrate as a function of the wavelengths of emitted radiation monitored while resputtering said substrate; and

terminating said resputtering in response to detection of conductor material of said conductor layer.

12. A process kit for a semiconductor sputter chamber having a window in a pressure wall, a detector disposed outside said window, a target and a workpiece support within said chamber and a plasma generation area between said workpiece support and said target, said kit comprising:

a shield adapted to be positioned between said target and said support, said shield having an aperture facing said plasma generation area and adapted to receive radiation emitted by said plasma; and

first and second reflective surfaces wherein said first reflective surface is adapted to be positioned to reflect radiation from said shield aperture to said second reflective surface and wherein said second reflective surface is adapted to be positioned to reflect radiation from said first reflective surface to said chamber window.

13. The kit of claim 12 further comprising a conduit adapted to be positioned between said shield aperture and said first reflective surface, said conduit having a plurality of internal reflective surfaces adapted to reflect radiation through said conduit.

14. The kit of claim 13 wherein said conduit has a first tubular portion having an opening facing said shield aperture and positioned to receive radiation from said shield aperture and said conduit further having a second tubular portion having an opening facing said first reflective surface and positioned to emit radiation to said first reflective surface wherein said first and second tubular portions are angled with respect to each other and said first and second tubular portions have a plurality of internal reflective surfaces adapted to reflect radiation from said first tubular portion opening to said second tubular portion opening.

15. A reactor for depositing material onto a substrate having a substrate layer of material, comprising:

a vacuum chamber adapted to maintain a vacuum pressure within said chamber, said chamber having a pressure wall which includes a window;

a substrate support disposed in said chamber and adapted to support said substrate;

a target surface disposed in said chamber and adapted to be sputtered to deposit metal material onto said substrate layer;

a coil disposed within said chamber and positioned to sputter coil material onto said substrate and to inductively couple energy to generate a plasma facing said substrate, said plasma emitting radiation wherein said chamber window is at least partially transparent to at least a portion of said plasma radiation;

a shield positioned to inhibit deposition of sputtered material onto said window; and

a labyrinth disposed in said chamber between said plasma generation area and said monitor and adapted to conduct radiation from said plasma generation area to said window.

16. The reactor of claim 15 further comprising a magnetron disposed adjacent said target and having an area of no more than about 1/4 of the area of the target and including an inner magnetic pole of one magnetic polarity surrounded by an outer magnetic pole of an opposite magnetic polarity, a magnetic flux of said outer pole being at least 50% larger than the magnetic flux of said inner pole.

17. A reactor for depositing material onto a substrate having a substrate layer of material, comprising:

a vacuum chamber adapted to maintain a vacuum pressure within said chamber, said chamber having a pressure wall which includes a window;

a substrate support disposed in said chamber and adapted to support said substrate;

a target surface disposed in said chamber and adapted to be sputtered to deposit metal material onto said substrate layer;

an etchant plasma generator disposed within said chamber and positioned to couple energy into the interior of said chamber to generate a plasma for resputtering said substrate, wherein said substrate support is adapted to bias said substrate to attract etchant plasma ions to resputter said substrate and wherein said plasma emits radiation and said chamber window is at least partially transparent to at least a portion of said plasma radiation;

a shield positioned to inhibit deposition of sputtered material onto said window; and

a labyrinth disposed in said chamber between said plasma generation area and said monitor and adapted to conduct radiation from said plasma generation area to said window.

18. The reactor of claim 17 wherein said shield has an aperture and said labyrinth includes first and second reflective surfaces wherein said first reflective surface is positioned to reflect radiation from said shield aperture to said second reflective surface and wherein said second reflective surface is positioned to reflect radiation from said first reflective surface to said chamber window, and a conduit positioned between said shield aperture and said first reflective surface, said conduit having a plurality of internal reflective surfaces adapted to reflect radiation through said conduit.

19. The reactor of claim 18 wherein said conduit has a first tubular portion having an opening facing said shield aperture and positioned to receive radiation

from said shield aperture and said conduit further having a second tubular portion having an opening facing said first reflective surface and positioned to emit radiation to said first reflective surface wherein said first and second tubular portions are angled with respect to each other and said first and second tubular portions have a plurality of internal reflective surfaces adapted to reflect radiation from said first tubular portion opening to said second tubular portion opening.

20. A system for depositing material onto a substrate having a substrate layer of material, comprising:

a chamber having a plasma generation area;

a substrate support disposed in said chamber and adapted to support said substrate;

a target disposed in said chamber and adapted to be sputtered to deposit metal material onto said substrate layer;

a first bias circuit coupled to said target and adapted to bias said target to sputter said target;

a plasma generator positioned to generate a plasma within said plasma generation area;

a second bias circuit adapted to bias said substrate to attract ions from said plasma to etch material from said substrate;

a monitor adapted to monitor radiation emitted by said plasma in said plasma generation area;

a labyrinth disposed in said chamber between said plasma generation area and said monitor and adapted to conduct radiation from said plasma generation area to said monitor; and

a controller adapted to control said first and second bias circuits to etch material from said substrate after sputtering material onto said substrate; said controller further being adapted to be responsive to said monitor to terminate said etching in response to radiation monitored through said labyrinth.

21. The system of claim 20 wherein said plasma generator includes an RF coil disposed within said chamber around said plasma generation area and an RF power supply coupled to said RF coil.

22. The system of claim 21 further comprising a third bias circuit coupled to said RF coil to bias said coil to attract ions to sputter said RF coil to deposit coil material onto said substrate wherein said controller is adapted to control said third bias circuit to sputter coil material onto said substrate while etching material from

said substrate, said controller further being adapted to terminate said coil sputtering when said etching is terminated.

23. The system of claim 20 further comprising a magnetron disposed adjacent said target and having an area of no more than about 1/4 of the area of the target and including an inner magnetic pole of one magnetic polarity surrounded by an outer magnetic pole of an opposite magnetic polarity, a magnetic flux of said outer pole being at least 50% larger than the magnetic flux of said inner pole.

24. A process kit for a semiconductor sputter chamber having a window in a pressure wall, a detector disposed outside said window, a target having sputterable material and a workpiece support within said chamber and a plasma generation area between said workpiece support and said target, said kit comprising:

shield means adapted to be positioned between said target and said chamber window, for shielding said chamber window from material sputtered from said target, said shield means having aperture means facing said plasma generation area for receiving radiation emitted by said plasma; and

radiation path means adapted to be positioned between said shield means and said chamber window, for reflecting radiation from said aperture means to said chamber window in a folded path.

25. A reactor system for depositing material onto a substrate having a substrate layer of material, comprising:

vacuum chamber means for maintaining a vacuum pressure, said chamber means having a pressure wall which includes a window;

means for generating a plasma within said chamber means;

target means for sputtering metal material within said chamber means to deposit metal material onto said substrate layer;

substrate biasing means for biasing said substrate to attract plasma ions to etch material from said substrate after metal material is sputtered onto said substrate;

monitoring means for monitoring radiation emitted by materials within said plasma, said monitoring means including radiation path means adapted to be positioned within said chamber between said plasma and said chamber means window, for reflecting radiation from said plasma to said chamber means window in a folded path; and

means for terminating said etching in response to radiation monitored through

said radiation path means.

26. A system for depositing material onto a substrate having a substrate layer of material, comprising:

vacuum chamber means for maintaining a vacuum pressure, said chamber means having a pressure wall which includes a window;

substrate support means disposed in said chamber means for supporting said substrate;

target means for sputter depositing metal material onto said substrate layer;

plasma generator means positioned to generate a plasma within a plasma generation area within said chamber means;

substrate biasing means for biasing said substrate to attract ions from said plasma to etch material from said substrate;

monitor means for monitoring radiation emitted by said plasma in said plasma generation area, said monitoring means including a radiation detector and also including labyrinth means disposed in said chamber means between said plasma generation area and detector, for conducting radiation from said plasma generation area to said detector in a folded radiation path; and

controller means for controlling said target means, plasma generator means and bias means to etch material from said substrate after sputtering material onto said substrate; said controller means further being responsive to said monitoring means to terminate said etching in response to radiation monitored by said monitoring means through said labyrinth means.